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information recording program, an information recording medium for recording the information recording program, an information reproducing apparatus for reproducing the recorded broadcasting information from the recording medium, an information reproducing
5 method, and an information reproducing program.

In order to solve the problem, a first invention provides an information recording apparatus for recording, on a recording medium such as a hard disk, broadcasting information such as a transport stream broadcasted with a plurality of pieces of unit information
10 such as a packet having a predetermined amount of information, the apparatus comprising: a constituting device such as a controller which causes a predetermined number of pieces of the unit information included in the received broadcasting information to constitute a set of unit information such as an allocation unit, a first
15 generating device such as a controller for generating receiving time information including a receiving time of a first received piece of the unit information included in the constituted set of unit information and a receiving time of a last received piece of the unit information included in the constituted set of unit
20 information, a detecting device such as a controller for detecting predetermined specific information included in the unit information, a second generating device such as a controller for generating, based on the detected specific information, corresponding information which includes corresponding time information
25 indicating a time corresponding to the specific information and corresponding position information indicating a position of the specific information in the set of unit information, a third

generating device such as a controller for generating identification information which indicates whether the receiving time information and the corresponding information are both recorded on the recording medium, and a recording device such as a controller for recording
5 the generated corresponding information, the generated receiving time information, and the generated identification information on the recording medium.

According to the first invention, the receiving time information for controlling the reproduction of the set of unit information
10 and the corresponding information for controlling the reproduction of specific information are both recorded on a recording medium with broadcasting information. Thus, it is possible to accurately identify the position of the specific information and reproduce the broadcasting information while increasing convenience in
15 reproducing the broadcasting information in sets of unit information.

In a preferred first embodiment of the first invention, according to the information recording apparatus of the first invention, the specific information is predetermined specific image information
20 included in the unit information and the second generating device uses a receiving time of the specific image information as the specific time.

According to the embodiment, the specific image information serves as the specific information and the receiving time of the
25 specific image information serves as the specific time, thereby accurately identifying the reproduction position of the broadcasting information with ease.

In a preferred second embodiment of the first invention, according to the information recording apparatus of the first invention, the specific information is predetermined specific image information included in the unit information and the second
5 generating device uses, as the specific time, a predetermined specific image information output time which corresponds to the specific image information and is broadcasted with the specific image information, the specific image information output time indicating a time when the specific image information is reproduced
10 and outputted after being recorded on the recording medium.

According to the embodiment, the specific image information serves as the specific information and the specific image information output information serves as the specific time, thereby accurately identifying the reproduction position of the broadcasting
15 information with ease.

In order to solve the problem, a second invention provides an information reproducing apparatus for reproducing the broadcasting information from the recording medium, the broadcasting information having been recorded on the recording medium by the information
20 recording apparatus according to any one of claims 1 to 3, the reproducing apparatus comprising: a first detecting device such as a controller for detecting the identification information from the recording medium, a second detecting device such as a controller for detecting the recorded corresponding information when the
25 detected identification information indicates that the receiving time information and the corresponding information are both recorded on the recording medium, an identifying device such as a controller

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for identifying a recording position of the broadcasting information to be reproduced on the recording medium by using the detected corresponding information, and a reproducing device such as a decoder for detecting and reproducing, from the identified recording position, the broadcasting information recorded on the recording position.

According to the second invention, when the receiving time information for controlling the reproduction of the set of unit information and the corresponding information for controlling the reproduction of the specific information are both recorded on the recording medium, the broadcasting information to be reproduced is identified and reproduced using the corresponding information. Thus, it is possible to accurately identify the position of the specific information and reproduce the broadcasting information while increasing convenience in reproducing the broadcasting information in sets of unit information.

In order to solve the problem, a third invention provides an information recording method for recording, on a recording medium such as a hard disk, broadcasting information such as a transport stream broadcasted with a plurality of pieces of unit information such as a packet having a predetermined amount of information, the method comprising: a constituting process of causing a predetermined number of pieces of the unit information included in the received broadcasting information to constitute a set of unit information such as an allocation unit, a first generating process of generating receiving time information including a receiving time of a first received piece of the unit information included in the constituted

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set of unit information and a receiving time of a last received piece of the unit information included in the constituted set of unit information, a detecting process of detecting predetermined specific information included in the unit information, a second
5 generating process of generating, based on the detected specific information, corresponding information which includes corresponding time information indicating a time corresponding to the specific information and corresponding position information indicating a position of the specific information in the set of
10 unit information, a third generating process of generating identification information which indicates whether the receiving time information and the corresponding information are both recorded on the recording medium, and a recording process of recording the generated corresponding information, the generated receiving time
15 information, and the generated identification information on the recording medium.

According to the third invention, the receiving time information for controlling the reproduction of the set of unit information and the corresponding information for controlling the reproduction
20 of the specific information are both recorded on the recording medium with the broadcasting information. Thus, it is possible to accurately identify the position of the specific information and reproduce the broadcasting information while increasing convenience in reproducing the broadcasting information in sets of unit
25 information.

In a preferred first embodiment of the third invention, according to the information recording method of the third invention, the

specific information is predetermined specific image information included in the unit information and the second generating process uses a receiving time of the specific image information as the specific time.

5 According to the embodiment, the specific image information serves as the specific information and the receiving time of the specific image information serves as the specific time, thereby accurately identifying the reproduction position of the broadcasting information with ease.

10 In a preferred second embodiment of the third invention, according to the information recording method of the third invention, the specific information is predetermined specific image information included in the unit information and the second generating process uses, as the specific time, a predetermined specific image
15 information output time which corresponds to the specific image information and is broadcasted with the specific image information, the specific image information output time indicating a time when the specific image information is reproduced and outputted after being recorded on the recording medium.

20 According to the embodiment, the specific image information serves as the specific information and the specific image information output information serves as the specific time, thereby accurately identifying the reproduction position of the broadcasting information with ease.

25 In order to solve the problem, a forth invention provides an information reproducing method for reproducing the broadcasting information from the recording medium, the broadcasting information

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having been recorded on the recording medium by the information recording method according to claim 5 or 6, the reproducing method comprising: a first detecting process of detecting the identification information from the recording medium, a second
5 detecting process of detecting the recorded corresponding information when the detected identification information indicates that the receiving time information and the corresponding information are both recorded on the recording medium, an identifying process of identifying a recording position of the broadcasting
10 information to be reproduced on the recording medium by using the detected corresponding information, and a reproducing process of detecting and reproducing, from the identified recording position, the broadcasting information recorded on the recording position.

According to the fourth invention, when the receiving time
15 information for controlling the reproduction of the set of unit information and the corresponding information for controlling the reproduction of the specific information are both recorded on the recording medium, the broadcasting information to be reproduced is identified and reproduced using the corresponding information.
20 Thus, it is possible to accurately identify the position of the specific information and reproduce the broadcasting information while increasing convenience in reproducing the broadcasting information in sets of unit information.

In order to solve the problem, the fifth invention provides
25 a recording computer included in an information recording apparatus for recording, on a recording medium, broadcasting information broadcasted with a plurality of pieces of unit information having

a predetermined amount of information, the computer being caused to act as: a constituting device which causes a predetermined number of pieces of the unit information included in the received broadcasting information to constitute a set of unit information, a first generating device for generating receiving time information including a receiving time of a first received piece of the unit information included in the constituted set of unit information and a receiving time of a last received piece of the unit information included in the constituted set of unit information, a detecting device for detecting predetermined specific information included in the unit information, a second generating device for generating, based on the detected specific information, corresponding information which includes corresponding time information indicating a time corresponding to the specific information and corresponding position information indicating a position of the specific information in the set of unit information, a third generating device for generating identification information which indicates whether the receiving time information and the corresponding information are both recorded on the recording medium, and a recording device for recording the generated corresponding information, the generated receiving time information, and the generated identification information on the recording medium.

According to the fifth invention, the recording computer operates so that the receiving time information for controlling the reproduction of the set of unit information and the corresponding information for controlling the reproduction of specific information are both recorded on a recording medium with broadcasting information.

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Thus, it is possible to accurately identify the position of the specific information and reproduce the broadcasting information while increasing convenience in reproducing the broadcasting information in sets of unit information.

5 In a preferred first embodiment of the fifth invention, according to the information recording program of the fifth invention, the specific information is predetermined specific image information included in the unit information and the recording computer acting as the second generating device is caused to operate using a receiving
10 time of the specific image information as the specific time.

 According to the embodiment, the recording computer operates so that the specific image information serves as the specific information and the receiving time of the specific image information serves as the specific time, thereby accurately identifying the
15 reproduction position of the broadcasting information with ease.

 In a preferred second embodiment of the fifth invention, according to the invention of the fifth invention, the specific information is predetermined specific image information included in the unit information in the information recording program of
20 the fifth invention, and the recording computer acting as the second generating device uses, as the specific time, a predetermined specific image information output time which corresponds to the specific image information and is broadcasted with the specific image information, the specific image information output time
25 indicating a time when the specific image information is reproduced and outputted after being recorded on the recording medium.

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According to the embodiment, the recording computer operates so that the specific image information serves as the specific information and the specific image information output information serves as the specific time, thereby accurately identifying the reproduction position of the broadcasting information with ease.

In order to solve the problem, the sixth invention provides a reproducing computer included in an information reproducing apparatus for reproducing the broadcasting information from the recording medium, the broadcasting information having been recorded on the recording medium by the information recording apparatus according to the first invention, the computer being caused to act as: a first detecting device for detecting the identification information from the recording medium, a second detecting device for detecting the recorded corresponding information when the detected identification information indicates that the receiving time information and the corresponding information are both recorded on the recording medium, an identifying device for identifying a recording position of the broadcasting information to be reproduced on the recording medium by using the detected corresponding information, and a reproducing device for detecting and reproducing, from the identified recording position, the broadcasting information recorded on the recording position.

According to the sixth invention, when the receiving time information for controlling the reproduction of the set of unit information and the corresponding information for controlling the reproduction of the specific information are both recorded on the recording medium, the reproducing computer operates so that the

broadcasting information to be reproduced is identified and reproduced using the corresponding information. Thus, it is possible to accurately identify the position of the specific information and reproduce the broadcasting information while
5 increasing convenience in reproducing the broadcasting information in sets of unit information.

In order to solve the problem, a seventh invention, the information recording program of the fifth invention is recorded so as to be read by the recording computer.

10 According to the seventh invention, when the information recording program of the fifth invention is recorded, the program is read and executed by the recording computer. Thus, the recording computer is caused to operate so that the receiving time information for controlling the reproduction of the set of unit information
15 and the corresponding information for controlling the reproduction of specific information are both recorded on the recording medium with broadcasting information. Therefore, it is possible to accurately identify the position of the specific information and reproduce the broadcasting information while increasing convenience
20 in reproducing the broadcasting information in sets of unit information.

When the information recording program of the preferred first embodiment of the fifth invention is recorded, the program is read and executed by the recording computer. Thus, the recording computer
25 operates so that the specific image information serves as the specific information and the receiving time of the specific image information

serves as the specific time, thereby accurately identifying the reproduction position of the broadcasting information with ease.

When the information recording program of the preferred second embodiment of the fifth invention is recorded, the program is read and executed by the recording computer. Thus, the recording computer operates so that the specific image information serves as the specific information and the specific image information output information serves as the specific time, thereby accurately identifying the reproduction position of broadcasting information with ease.

In order to solve the problem, an eighth invention, the information reproducing program of the sixth invention is recorded so as to be read by the reproducing computer.

According to the eighth invention, an information reproducing program of the sixth invention is read and executed by the reproducing computer. Thus, when the receiving time information for controlling the reproduction of a set of unit information and the corresponding information for controlling the reproduction of specific information are both recorded on a recording medium, the reproducing computer operates so that broadcasting information to be reproduced is identified and reproduced using the corresponding information. Thus, it is possible to accurately identify the position of the specific information and reproduce the broadcasting information while increasing convenience in reproducing the broadcasting information in sets of unit information.

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Brief Description of Drawings

FIG. 1 is a diagram (I) for explaining a recording format of an embodiment;

FIG. 2 is a diagram (II) for explaining the recording format
5 of the embodiment;

FIG. 3 is a diagram (III) for explaining the recording format of the embodiment;

FIG. 4 is a diagram (IV) for explaining the recording format of the embodiment;

10 FIG. 5 is a diagram (V) for explaining the recording format of the embodiment;

FIG. 6 is a diagram (VI) for explaining the recording format of the embodiment;

15 FIG. 7 is a diagram (VII) for explaining the recording format of the embodiment;

FIG. 8 is a diagram (VIII) for explaining the recording format of the embodiment;

FIG. 9 is a block diagram showing the schematic configuration of an information recording apparatus according to the embodiment;

20 FIG. 10 is a flowchart (I) showing the recording of the embodiment;

FIG. 11 is a flowchart (II) showing the recording of the embodiment;

25 FIG. 12 is a diagram showing a specific example of the present invention;

FIG. 13 is a flowchart showing the reproduction of the embodiment; and

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CLAIMS

1. An information recording apparatus for recording, on a recording medium, broadcasting information broadcasted with a plurality of pieces of unit information having a predetermined amount of
5 information,

the apparatus comprising:

a constituting device which causes a predetermined number of pieces of the unit information included in the received broadcasting information to constitute a set of unit information,

10 a first generating device for generating receiving time information including a receiving time of a first received piece of the unit information included in the constituted set of unit information and a receiving time of a last received piece of the unit information included in the constituted set of unit information,

15 a detecting device for detecting predetermined specific information included in the unit information,

a second generating device for generating, based on the detected specific information, corresponding information which includes corresponding time information indicating a time corresponding to
20 the specific information and corresponding position information indicating a position of the specific information in the set of unit information,

a third generating device for generating identification information which indicates whether the receiving time information
25 and the corresponding information are both recorded on the recording medium, and

a recording device for recording the generated corresponding information, the generated receiving time information, and the generated identification information on the recording medium.

- 5 2. The information recording apparatus according to claim 1, wherein the specific information is predetermined specific image information included in the unit information, and

the second generating device uses a receiving time of the specific image information as the specific time.

10

3. The information recording apparatus according to claim 1, wherein the specific information is predetermined specific image information included in the unit information, and

15 the second generating device uses, as the specific time, a predetermined specific image information output time which corresponds to the specific image information and is broadcasted with the specific image information, the specific image information output time indicating a time when the specific image information is reproduced and outputted after being recorded on the recording
20 medium.

4. An information reproducing apparatus for reproducing the broadcasting information from the recording medium, the broadcasting information having been recorded on the recording medium by the
25 information recording apparatus according to any one of claims 1 to 3,

the reproducing apparatus comprising:

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a first detecting device for detecting the identification information from the recording medium,

a second detecting device for detecting the recorded corresponding information when the detected identification information indicates that the receiving time information and the corresponding information are both recorded on the recording medium,

an identifying device for identifying a recording position of the broadcasting information to be reproduced on the recording medium by using the detected corresponding information, and

10 a reproducing device for detecting and reproducing, from the identified recording position, the broadcasting information recorded on the recording position.

5. An information recording method for recording, on a recording medium, broadcasting information broadcasted with a plurality of pieces of unit information having a predetermined amount of information,

the method comprising:

20 a constituting process of causing a predetermined number of pieces of the unit information included in the received broadcasting information to constitute a set of unit information,

a first generating process of generating receiving time information including a receiving time of a first received piece of the unit information included in the constituted set of unit information and a receiving time of a last received piece of the unit information included in the constituted set of unit information,

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a detecting process of detecting predetermined specific information included in the unit information,

5 a second generating process of generating, based on the detected specific information, corresponding information which includes corresponding time information indicating a time corresponding to the specific information and corresponding position information indicating a position of the specific information in the set of unit information,

10 a third generating process of generating identification information which indicates whether the receiving time information and the corresponding information are both recorded on the recording medium, and

15 a recording process of recording the generated corresponding information, the generated receiving time information, and the generated identification information on the recording medium.

6. The information recording method according to claim 5, wherein the specific information is predetermined specific image information included in the unit information, and

20 the second generating process uses a receiving time of the specific image information as the specific time.

7. The information recording method according to claim 5, wherein the specific information is predetermined specific image information included in the unit information, and

25 the second generating process uses, as the specific time, a predetermined specific image information output time which

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corresponds to the specific image information and is broadcasted with the specific image information, the specific image information output time indicating a time when the specific image information is reproduced and outputted after being recorded on the recording
5 medium.

8. An information reproducing method for reproducing the broadcasting information from the recording medium, the broadcasting information having been recorded on the recording medium by the
10 information recording method according to claim 5 or 6,

the reproducing method comprising:

a first detecting process of detecting the identification information from the recording medium,

a second detecting process of detecting the recorded
15 corresponding information when the detected identification information indicates that the receiving time information and the corresponding information are both recorded on the recording medium,

an identifying process of identifying a recording position of the broadcasting information to be reproduced on the recording medium
20 by using the detected corresponding information, and

a reproducing process of detecting and reproducing, from the identified recording position, the broadcasting information recorded on the recording position.

25 9. An information recording program for causing a recording computer to function as a constituting device, a first generating device, a detecting device, a second generating device, a third

generating device, and a recording device, the recording computer being included in an information recording apparatus for recording, on a recording medium, broadcasting information broadcasted with a plurality of pieces of unit information having a predetermined amount of information,

the constituting device causing a predetermined number of pieces of the unit information included in the received broadcasting information to constitute a set of unit information,

the first generating device generating receiving time information including a receiving time of a first received piece of the unit information included in the constituted set of unit information and a receiving time of a last received piece of the unit information included in the constituted set of unit information,

the detecting device detecting predetermined specific information included in the unit information,

the second generating device generating, based on the detected specific information, corresponding information which includes corresponding time information indicating a time corresponding to the specific information and corresponding position information indicating a position of the specific information in the set of unit information,

the third generating device generating identification information which indicates whether the receiving time information and the corresponding information are both recorded on the recording medium, and

the recording device recording the generated corresponding information, the generated receiving time information, and the generated identification information on the recording medium.

5 10. The information recording program according to claim 9, wherein the specific information is predetermined specific image information included in the unit information, and

the recording computer acting as the second generating device is caused to operate using a receiving time of the specific image
10 information as the specific time.

11. The information recording program according to claim 9, wherein the specific information is predetermined specific image information included in the unit information, and

15 the recording computer acting as the second generating device is caused to operate using, as the specific time, a predetermined specific image information output time which corresponds to the specific image information and is broadcasted with the specific image information, the specific image information output time
20 indicating a time when the specific image information is reproduced and outputted after being recorded on the recording medium.

12. An information reproducing program for causing a reproducing computer to function as a first detecting device, a second detecting
25 device, an identifying device, and a reproducing device, the reproducing computer being included in an information reproducing apparatus for reproducing the broadcasting information from the

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recording medium, the broadcasting information having been recorded
on the recording medium by the information recording apparatus
according to any one of claims 1 to 3,

the first detecting device detecting the identification
5 information from the recording medium,

the second detecting device detecting the recorded
corresponding information when the detected identification
information indicates that the receiving time information and the
corresponding information are both recorded on the recording medium,

10 the identifying device identifying a recording position of the
broadcasting information to be reproduced on the recording medium
by using the detected corresponding information, and

the reproducing device detecting and reproducing, from the
identified recording position, the broadcasting information
15 recorded on the recording position.

13. An information recording medium, wherein the information
recording program in any one of claims 9 to 11 is recorded so as
to be read by the recording computer.

20

14. An information recording medium, wherein the information
reproducing program of claim 12 is recorded so as to be read by
the reproducing computer.